ABSTRACT

A Modular Operating Topology Element (MOTE) is provided within a software-latticed networked topology for implementing ultra-concurrent operation of a plurality of such elements. Each MOTE is a single miniaturized package having a prevailing standard form, e.g., Compact Flash, with an embedded a full function processor (CPU), a unique resident operating system, and dedicated applications. The external interface of each MOTE projects a virtual mass storage volume. A MOTE selectively acts as an ultra-modular processor, operating with ultra-concurrency, with the CPU internally bus connected to non-volatile RAM, dedicated non-volatile ROM (firmware), a dedicated battery-backed real-time clock-calendar unit, and a dedicated interrupt monitor unit. Internally accessed data and internal applications stored in ROM or in non-volatile RAM are invisible to the outside. Optional input/output devices may be connected to the internal hardware bus. A host external bus connection is provided which is compatible with prevailing bus standards for mass storage volumes, e.g., compact flash memory, which support file-level in prevailing format data transfers. A software-latticed network of one or more MOTEs defines a network element for a larger system. Multiple MOTEs, which define the latticed network element, are software-lattice-interconnected to operate concurrently in a non-hierarchical (ladder) interconnection using a circulating message exchange protocol compatible with physically concurrent operation of the modular processors (MOTE's). MOTE resident software MOTE mirrors the topology of the inter-modular processor architecture, permitting support of concurrent logical processes wherein there is an exchange of messages circulated on a logical (software) bus. Each MOTE within a lattice network is dedicated to a specific function on behalf of the whole system and operates highly independently and concurrently.